In the Claims

1. (Previously Presented) A phase-locked loop bandwidth calibration circuit, comprising:

a programmable charge pump;

a phase-locked loop filter operatively connected to said programmable charge pump;

an oscillator, operatively connected to said phase-locked loop filter, to generate a frequency signal based upon a signal received from said phase-locked loop filter; and

a control loop operatively connected to said phase-locked loop filter and said programmable charge pump;

said control loop including a gain measurement circuit, operatively connected to said oscillator, to measure a gain of said oscillator;

said control loop controlling said programmable charge pump to adjust its output current level based on the measured gain of said oscillator;

said gain measurement circuit including,

a voltage difference measurement circuit, operatively connected to said phase-locked loop filter, to measure a voltage difference corresponding to two voltages being output from said phase-locked loop filter at different times,

an analog to digital converter, operatively connected to said voltage difference measurement circuit, to convert the measured voltage difference into a digital signal, and

a controller to cause said programmable charge pump to adjust its output current level based upon a received digital signal from said analog to digital converter.

Claim 2 (Cancelled)

3. (Original) The phase-locked loop bandwidth calibration circuit as claimed in claim 1, wherein said control loop controls said programmable charge pump to adjust its output current level so that the product of the measured gain and a charge pump current level is kept constant.

4. (Previously Presented) The phase-locked loop bandwidth calibration circuit as claimed in claim 1, further comprising:

a voltage reference circuit, operatively connected to said programmable charge pump and said analog to digital converter, to generate and apply a same reference voltage to said programmable charge pump and said analog to digital converter based upon changes in a reference voltage.

5. (Previously Presented) The phase-locked loop bandwidth calibration circuit as claimed in claim 1, further comprising:

an integer-N divider operatively connected to an output of said oscillator; and

a phase and frequency detector operatively connected between said integer-N divider and said programmable charge pump.

6. (Original) The phase-locked loop bandwidth calibration circuit as claimed in claim 5, wherein said control loop controls said programmable charge circuit to adjust its output current level so that the product of the measured gain and a charge pump current level divided by an average N value, said N value being provided by said integer-N divider, is kept constant.

7. (Original) The phase-locked loop bandwidth calibration circuit as claimed in claim 1, further comprising:

an integer-N divider operatively connected to an output of said oscillator;

a sigma-delta-modulator operatively connected to said integer-N divider; and

a phase and frequency detector operatively connected between said integer-N divider and said programmable charge pump.

8. (Original) The phase-locked loop bandwidth calibration circuit as claimed in claim 7, wherein said control loop controls said programmable charge pump to adjust its output current level so that the product of the measured gain and a charge pump current level divided by an average N value, said N value being provided by said integer-N divider, is kept constant.

9. (Previously Presented) A phase-locked loop bandwidth calibration circuit, comprising:

a programmable charge pump;

a phase-locked loop filter operatively connected to said programmable charge pump;

an oscillator, operatively connected to said phase-locked loop filter, to generate a frequency signal based upon a signal received from said phase-locked loop filter;

a control loop operatively connected to said phase-locked loop filter and said programmable charge pump;

said control loop including a gain measurement circuit, operatively connected to said oscillator, to measure a gain of said oscillator;

said control loop controlling said programmable charge pump to adjust its output current level based on the measured gain of said oscillator;

a programmable gain amplifier;

a comparator for comparing a voltage of an output from said programmable gain amplifier with a voltage necessary to produce a predetermined frequency shift in said oscillator to produce a gain signal; and

a gain controller, in response to said gain signal produced by said comparator, to control a gain of said programmable gain amplifier.

10. (Original) The phase-locked loop bandwidth calibration circuit as claimed in claim 9, wherein said gain controller includes a counter and a plurality of resistors, said plurality of resistors being switchable into or out of a circuit connected between an output of said programmable gain amplifier and an input of said programmable gain amplifier.

11. (Original) The phase-locked loop bandwidth calibration circuit as claimed in claim 9, wherein said gain controller controls the gain of said programmable gain amplifier such that a full scale input to said programmable gain amplifier produces said predetermined frequency shift in said oscillator.

12. (Original) The phase-locked loop bandwidth calibration circuit as claimed in claim 1, wherein said phase-locked loop filter includes a capacitor; a charging circuit to pre-charge said capacitor to a voltage of said phase-locked loop filter; and a switch to switch said capacitor into the phase-locked loop filter circuit to effect a phase-locked loop bandwidth.

13. (Original) The phase-locked loop bandwidth calibration circuit as claimed in claim 1, wherein said phase-locked loop filter includes a dual path having an integrator path and a lead-lag path.

14. (Original) The phase-locked loop bandwidth calibration circuit as claimed in claim 13, wherein said programmable charge pump provides a first current output level to said integrator path and a second current output level to said lead-lag path.

Claims 15-26 (Cancelled)

27. (Currently Amended) A method of calibrating a phase-locked loop bandwidth, comprising:

(a) setting a phase-locked loop at a local oscillator offset;

(b) allowing the phase-locked loop to settle;

(c) measuring, after allowing the phase-locked loop set to the local oscillator offset to settle, a first voltage of a voltage-controlled oscillator located in the phase-locked loop;

(d) setting the phase-locked loop to a channel center frequency;

(e) allowing the phase-locked loop to settle;

(f) measuring, after allowing the phase-locked loop set to the channel center frequency to settle, a second voltage of the voltage-controlled oscillator;

(g) determining a difference between the first and second voltage measurements; and

(h) controlling a programmable charge circuit located in the phase-locked loop to adjust its output current level based on the determined voltage difference.

28. (Original) The method as claimed in claim 27, wherein the programmable charge circuit adjusts its output current level so that the product of a measured gain and a charge pump current level is kept constant.

Claims 29-39 (Cancelled)